Organizational Structure of Telehealth Care: Factors That Contribute to Growth and Sustainability

by Teresa S. Welsh, Ph.D.*

Introduction

Although telemedicine has been touted as an answer to the disparity in access to health care in the United States, use of telemedicine by health care professionals has been uneven. Although telemedicine activity has been reported in 48 states, only nine states accounted for 50% of the activity in 1998. Only 50 telemedicine programs accounted for almost 60% of total telemedicine activity (Grigsby and Brown, 1999).

To understand why and how telemedicine systems may be successfully implemented, sustained and grown, the infrastructure of several different types of benchmark telemedicine networks are examined, and from this, recommendations for network development, sustainability and growth are developed.

Research Method

To understand the diversity of organizational settings in which telemedicine networks are now situated, this research examines networks that are located in the following organizations: academic medical centers; nonacademic medical centers; statewide telemedicine networks; and telemedicine networks located within a health insurance company. The case study method is used to determine factors that contributed to and detracted from network development. Such factors as funding sources; health care provider and patient acceptance; technical factors; location within the parent organization; availability or non-availability of reimbursement; and other factors that were discovered through in-depth interviews with key informants within the telemedicine network under study. Key informants were chosen based on their length of stay within the network and by recommendations from personnel within the network under study, and from personnel in other networks.

Research Questions

The following research questions were used to guide the research:

1. What is the organizational structure of an academic institution/school of medicine telemedicine network versus a non-academic institution/school of medicine telemedicine network versus a statewide telemedicine network versus an insurer-run telemedicine network? What is the hierarchical structure, funding source(s), type and level of staffing?
2. What kinds of human resources are necessary, and what roles must they play? What capabilities are necessary?
3. What are the organizational problems and barriers of building, maintaining, and sustaining a telemedicine network?
4. What organizational structure is most conducive for success in a telemedicine network? Success can be defined as sustainability, full use, increased access and diversity of services offered. The definition of success will be determined by the key informants of a particular telemedicine network.

Literature Review: Telemedicine and Telehealth

A systematic review of clinical trial reports on the efficacy of distance medicine electronic technologies found favorable evidence that these technologies could improve access to health care and support quality and continuity of clinical health care (Balas, et al, 1997). An analysis of recent research literature on the effect of telemedicine on doctor-patient communication identified 38 studies: 6 surveys of health care providers and community attitudes, 21 post telemedicine encounter surveys, and 11 qualitative encounter behavioral studies (Miller, 2001). The findings were 80% favorable to telemedicine in general, and predominately favorable in all but 2 of the 23 categories, nonverbal behavior and lack of touch.

A review of 32 studies of clinical patient satisfaction with telemedical encounters reports that patients generally are satisfied with telemedicine as a health delivery system (Mair and Whitten, 2000; Puskin, et al 1997a). While the level of patient acceptance of telemedicine is generally high, provider acceptance is somewhat lower. Grigsby (1995) asserts that physician reluctance to adopt telemedicine is attitudinal and may reflect such issues as political philosophy, lack of behavioral and financial incentives, and the perception of telemedicine as a threat.

Despite the benefits, successes and cost savings of telemedicine, the percentage of telemedicine in overall health services is small. According to the Association of Telehealth Service Providers (ATSP) president, Dr. Douglas Perednia (1999),

> "There are relatively few providers who know that telemedicine exists and even fewer healthcare consumers. Our survey reported only 2,108 providers involved in telemedicine in 1997. That's a tiny number compared to the hundreds of thousands of doctors in the United States alone. Probably fewer than 1 percent of U.S. physicians actually deal with telemedicine, and I would be willing to bet that fewer than 5 percent have any working knowledge of it."

Literature Review: Telemedicine/ Telehealth Case Studies

A review of case studies in tele-psychiatry concluded that even low-cost POTS (plain old telephone system) video-phone consultations created a valuable connection between specialists in academic centers and patients with a local health care provider (doctor, nurse-practitioner or nurse) in rural areas. The principle value of the visual element seems to be in creating a social presence, or tele-presence, with visual and interpersonal cues, such as eye contact, nods, facial expressions, and body language (Cukor et al, 1998).

A case study of the University of Kansas Telemedicine Program found that organizational communication and structure may be critical to the successful adoption of telemedicine technology. Recommendations that were adopted as a result of this study include: a definition of employee roles and responsibilities, simplification of consultation scheduling, clarification of leadership and decision-making, and clarification of telemedicine terminology (Whitten and Allen, 1995).

An investigation of whether and how

See TELEHEALTH CARE, page 9

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TELEHEALTH CARE, from page 3

telemedicine affects hospital costs was based on surveys and interviews with hospital administrators in North Carolina, South Carolina, and Georgia. Objectives of the research included: the identification of hospital characteristics that are related to adopting telemedicine technology and the identification of derived benefits from their adoption of telemedicine (Emery, 1998):

- Quantitative survey research data indicate that several factors independently increase the odds of the adoption of telemedicine by hospitals: not-for-profit status, a multi-hospital and/or network affiliation, and size (large number of hospital beds).
- Qualitative survey and interview research data suggest that hospital administrators adopt telemedicine as a competitive strategy and as a managed care strategy.

Case Study Research Design

Case study is a methodology that involves collecting evidence from multiple sources. Yin notes that case studies should use a broad variety of techniques: surveys, archive analyses, documentary searches, field observations, even quantitative data, and says "In fact, the more all of these techniques are used in the same study, the stronger the case study evidence will be" (Yin, 1999). Case study methodology is considered most appropriate when "a 'how' or 'why' question is being asked about a contemporary set of events over which the investigator has little or no control" (Yin, 1994).

The specific research methods used in these case studies include in-depth interviews with key informants, coding interview transcripts with NUD*IST qualitative software, triangulation of interview data with published reports and archival data, and qualitative data analysis. Construct validity was assured by triangulating, or cross-checking, with multiple sources of evidence and by having the key informants review a draft analysis of their interview. No major changes were necessary, but minor changes and additions for clarification were suggested by the key informants and incorporated into the analysis. To assure accuracy, all of the data were cross-checked with other sources including official Web sites, research publications, and federal grant progress reports from the Office for the Advancement of Telehealth (OAT) obtained through a Freedom of Information Act request.

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Reliability was assured in this multiple case study by pilot case study research, by following Yin's case study protocol and by developing a case study database. Results from each telemedicine program were compiled, analyzed and compared for similarities and differences among different types of telemedicine networks in:

1. Organizational structure, type and level of staffing
2. Kinds of human resources, their roles and necessary capabilities
3. Organizational problems and barriers of building, maintaining, and sustaining a telemedicine network
4. Organizational structure most conductive for a successful telemedicine network.

For this study, two cases were selected from each of four types of telehealth organizations: academic medical centers, non-academic medical centers or networks, statewide telemedicine networks, and telemedicine programs located within a health insurance company. Selection criteria include length of time in operation (at least three years), geographic diversity, and quantity and availability of published documentation associated with the telemedicine network determined by bibliographic analysis.

The two key informants from telemedicine programs located within health insurance companies were reluctant to have their corporate identities revealed, in part because of corporate proprietary information, so they will be identified as Insurer-based One and Insurer-based Two.

Academic Medical Centers:

1. Arizona Telemedicine Program
2. East Carolina University Telemedicine Program

Non-academic Medical Centers or Networks:

3. Eastern Montana Telemedicine Network
4. Marshfield Clinic TeleHealth Network

Statewide Telemedicine Networks:

5. University of Kansas Center for Telemedicine and Telehealth
6. Missouri Telehealth Network

Results and Analysis

Analysis of the key informants' interviews, publications, and grant progress reports was used to determine whether any structural commonalities exist in the telemedicine programs across these different types of organizations, to determine whether any unique features exist in the telemedicine programs within each type of organization. While there are some minor structural differences in telemedicine programs among the different types of organizations in this study, there are many more commonalities.

Research Question 1: *What is the organizational structure of an academic institution/school of medicine telemedicine network versus a non-academic institution/school of medicine telemedicine network versus a statewide telemedicine network versus an insurer-run telemedicine network? What is the hierarchical structure, what are funding sources, and what is the type and level of staffing?*

In both academic medical centers the telemedicine program is located within the medical school, Arizona within the Department of Pathology and East Carolina within the Department of Health Communications. Both non-academic-based systems, Eastern Montana Telemedicine Network and Marshfield Clinic TeleHealth Network, are integrated within an organization of health clinics: Montana under Marketing and Marshfield under Pro-Active Health Services. Both statewide networks are headquartered within their state university medical schools: Kansas within the Department of Information Technology and Missouri within the Department of External Affairs.

All of the telemedicine programs in this study are funded by multiple and diverse sources. All receive grant funding as well as

See TELEHEALTH CARE, next page

TELEHEALTH CARE, from page 9

internal support. The two insurer-based programs are funded by state grants. The others are funded by federal grants, primarily from OAT. All non-insurer-based systems receive insurance reimbursement. The two statewide telemedicine networks, as well as one of the academic medical systems, Arizona, receive state line-item funding. Other sources of funding include network membership fees from the network spoke sites (East Carolina and Eastern Montana) and income from a telemedicine training program (East Carolina).

All the telemedicine programs, with the exception of the two insurer-based programs that declined to answer, employ a combination of both full-time and part-time staff. Four of the six programs have only three or four full-time employees, and four programs have two to four part-time employees.

A statewide system seems to be a particularly efficient way to develop a telemedicine network, particularly within a pre-existing statewide medical system. A combination of state funding and federal grants with local in-house organizational support insures funding for sustainability and growth of the network. Additional services provided through the network, such as in-house training, CME courses, or public health education, add value to network membership and may provide an additional source of revenue for the network.

Telemedicine or telehealth is typically a separate department within the organization, logically located within another, larger department with technology resources, such as radiology, health communications, or patient outreach services.

Research Question 2. *What kinds of human resources are necessary, and what roles must they play? What capabilities are necessary?*

Academic-based. Although the academic-based telemedicine programs, Arizona and ECU, appear to have an opposite configuration (Arizona: 4 FTEs, 18 PTEs; ECU: 17 FTEs, 2 PTEs), they have some elements in common. Both programs employ a director, an associate director, a distance education coordinator, project manager/director, telemedicine coordinators, administrative assistant(s), and telemedicine technicians. Arizona's employee structure appears to be more integrated and flexible, while ECU's focus is oriented toward large projects, such as its telemedicine training program and an NLM Next Generation Internet Project.

Non-academic-based. The two non-academic-based programs, Eastern Montana Telemedicine and Marshfield Clinic TeleHealth, are similarly integrated into their clinic-based systems. Each program supports a full-time director/manager. Additionally, grant funding supports two telemedicine technicians and a telemedicine registered nurse at Montana and two clinicians at Marshfield. Each of the fifteen Montana spoke sites supports a .5 FTE. Part-time employees at Marshfield Clinic TeleHealth include a medical director, an administrative director, information services personnel and a scheduler.

The major remaining barriers of developing and sustaining a telemedicine network fall into two main categories: lack of telecommunication infrastructure and reluctance to adopt and support telehealth and telemedicine by health care provider administrators and physicians.

Statewide Networks. Kansas employs 13 full-time employees, including four project managers, a project coordinator, two video technicians, and a media production manager. Two part-time employees are research assistants. Full-time employees at Missouri include an executive director, an assistant director, an administrative associate and an administrative assistant. Four part-time employees include a coordinator of program and project support, a continuing education coordinator, a network support specialist, and a user support analyst.

Employee roles and capabilities seem to fall into several categories:

1. Administrative, including a director/manager, assistant(s), scheduler(s)
2. Director, project manager(s), coordinator(s), telemedicine nurse(s)
3. Research, including data collector(s), evaluator(s)
4. Technical support, such as telemedicine engineer(s), technician(s)

Another possible category, education, may include distance education coordinator(s) and assistant(s) and/or telemedicine training coordinator(s) and assistant(s).

In half the organizations in this study, physician specialists are actively involved in developing and overseeing the telemedicine program. Direct involvement of medical specialists seems to be an important factor in recruiting their colleagues and other specialty physicians to participate in telemedicine. Another important telemedicine health care professional is a registered nurse. All the programs in this study employed at least one (and usually more than one) telemedicine RN who performs a variety of duties, from training to coordinating specific projects. A technical support specialist is another vital member of the telemedicine team. Engineers and/or technicians insure the smooth operation of the telecommunications infrastructure and equipment, the conduit over which the telemedicine network operates. Other important support personnel for the telemedicine team may include administrative assistants and/or schedulers, evaluation researchers and grant-writing specialists.

Research Question 3. *What are the organizational problems and barriers of building, maintaining, and sustaining a telemedicine network?*

According to the key informants, the major barriers to building, maintaining and sustaining a telemedicine network are:

1. The cost of telecommunications lines and lack of telecommunications infrastructure
2. Physician participation, both referring and providing
3. Concerns about costs and profitability of the telemedicine network; concerns about limited insurance reimbursement for telehealth services
4. Internal support, organizational politics, lack of understanding, lack of champions, resistance to change

Telemedicine is becoming increasingly accepted by insurance companies as a cost-effective health care delivery system. The major remaining barriers of developing and sustaining a telemedicine network fall into two main categories: lack of telecommunication infrastructure or prohibitive cost of using existing infrastructure and reluctance to adopt and support telehealth and

See TELEHEALTH CARE, next page

TELEHEALTH CARE, from page 10

telemedicine by health care provider administrators and physicians.

Research Question 4. *What organizational structure is most conducive for success in a telemedicine network? Success can be defined as sustainability, full use, increased access and diversity of services offered. The definition of success will be determined by the key informants of a particular telemedicine network.*

According to the key informants, organizational factors that overcome barriers and influence success and sustainability of a telemedicine program include:

1. Development and implementation of telecommunications infrastructure, what Puskin calls a "televillage" (Puskin et al, 1997b)
2. Multiple uses of the telemedicine network for telehealth, telemedicine, distance education, and community service and development
3. Formation of an advisory oversight group of key players to identify health care needs and to assist in devising and funding network strategies to address those needs
4. Movement toward integration of telemedicine into departments and physician desktop environments
5. Development and strengthening of relationships between referring and providing physicians and between health care providers and consumers
6. Multiple and diverse sources of funding
7. Support and marketing, including in-service training and promotion of telehealth and telemedicine services and external consumer marketing.

Recommendations for Developing, Growing, and Sustaining a Telehealth Network

Based on this study's data collection and analysis, the following organizational factors are recommended for developing, growing, and sustaining a telehealth network (Welsh, 2002):

1. Development of statewide telehealth networks as part of larger statewide and national telecommunication infrastructure linking schools, libraries, hospitals, and clinics for multi-dimensional purposes of education, health care, and community development
2. Multiple sources of funding including state funding, federal grant funding, and internal institutional support. If state funding is not available, other strategies may be required, such as a network membership fee, a fee for deliverables such as distance training or CME courses, or a fee for specific telehealth services.
3. Development of integrative, multimedia electronic patient records, secure but accessible by health care providers and by patients
4. A telehealth advisory oversight group composed of key players in state government, higher education, the telecommunications industry and health care education and administration. Objectives of the group should include identification of health care needs and the development of funding and implementation strategies to meet those needs via the telehealth network
5. Integration of telemedicine training into physician education and residency programs, and in-service telemedicine training of existing health care providers
6. Adequate staffing of telehealth networks, including a director and/or physician medical director, telenurse(s), engineer(s) and/or technician(s), and scheduler(s) and/or administrative assistant(s). Other staff may include project coordinator(s), research evaluator(s), and education coordinator(s) and/or trainer(s).
7. Marketing of telemedicine and telehealth services to the public and to referring and specialty health care providers.

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